REMARKS

Claims 1 - 2, 4 - 12, 14 - 18, 20 - 47, and 50 - 51 are pending. Claims 1, 9, 17, and 25 - 27 have been amended. Claim 13 has been cancelled. Claims 50 and 51 have been added. No new matter has been introduced. Reexamination and reconsideration of this application are respectfully requested.

In the June 2, 2005 Office Action, the Examiner rejected claims 1 - 2, 5 -13, 15 - 18, 20 - 21, and 23 - 47 under 35 U.S.C. §103(a) as being obvious over U.S. Patent No. 5,504,270 to Sethares ("the Sethares reference"), in view of U.S. Patent No. 5,536,902 to Serra ("the Serra reference"). The Examiner rejected claims 4, 14, and 22 under 35 U.S.C. §103(a) as being obvious over the Sethares reference, in view of a combination of the Serra reference, and further in view of well known prior art. These rejections are respectfully traversed in so far as they are applicable to the pending claims.

Independent claim 1, as amended, distinguishes over the cited references. Independent claim 1, as amended, recites:

> An apparatus for converting an input voice signal into an output voice signal according to a reference voice signal, the apparatus comprising:
>
> extracting means for extracting only deterministic components from the input voice signal, the deterministic components including a plurality of sinusoidal wave components which are numbered sequentially, wherein the input voice signal includes the deterministic components and residual components;
>
> separating means for separating the sinusoidal wave components into frequency value coordinates and amplitude value coordinates which are numbered sequentially in a manner the same as the sinusoidal wave components;
>
> memory means for storing reference pitch information representative of a pitch of the reference voice signal, **the pitch information including primary pitch information representative of a discrete pitch matching a music scale and secondary pitch information representative of a fractional pitch fluctuating relative to the discrete pitch,** and storing reference amplitude information representative of reference amplitude value coordinates, which are numbered sequentially, of the sinusoidal wave components contained in the reference voice signal;
>
> first modulating means for modulating the frequency value coordinates of the sinusoidal wave components of the input voice signal according to the primary reference pitch information retrieved from the memory means, to generate modulated frequency value coordinates, **the first modulating means further modulating the modulated frequency value coordinates of the sinusoidal wave components of the input voice signal according to the secondary reference pitch information retrieved from the**

memory means, to generate further modulated frequency value coordinates;

control means for setting control parameters effective to control degrees of the modulation of the frequency value coordinates by the primary reference pitch information and the secondary pitch information, respectively, so that a degree of influence of the pitch of the reference voice signal to a pitch of the output voice signal is determined according to the control parameters;

second modulating means for modulating the amplitude value coordinates of the sinusoidal wave components of the input voice signal according to the reference amplitude information representative of the reference amplitude value coordinates which are numbered correspondingly to the amplitude value coordinates of the input voice signal, retrieved from the memory means, such that each amplitude value coordinate of the input voice signal is mixed with the corresponding reference amplitude value coordinate by a set ratio;

combining means for combining each of the modulated frequency value coordinates and each of the further modulated amplitude value coordinates to synthesize sinusoidal wave components of the output voice signal having an output pitch and an output timbre different from an input pitch and an input timbre of the input voice signal, and influenced by a reference pitch and a reference timbre of the reference voice signal; and

mixing means for mixing the synthesized sinusoidal wave components having the modulated frequency value coordinates to synthesize the output voice signal having a pitch different from that of the input voice signal and influenced by the pitch of the reference voice signal.

The Sethares reference does not disclose, teach, or suggest the apparatus of claim 1, as amended. The Sethares reference does not disclose an apparatus for converting a voice input signal into a voice output signal including memory means for storing reference pitch information representative of a pitch of the reference voice signal, **the pitch information including primary pitch information representative of a discrete pitch matching a music scale and secondary pitch information representative of a fractional pitch fluctuating relative to the discrete pitch,** first modulating means for modulating the frequency value coordinates of the sinusoidal wave components of the input voice signal according to the primary reference pitch information retrieved from the memory means, to generate modulated frequency value coordinates, **the first modulating means further modulating the modulated frequency value coordinates of the sinusoidal wave components of the input voice signal according to the secondary reference pitch information retrieved**

from the memory means, to generate further modulated frequency value coordinates. The Sethares reference does not disclose the utilization of secondary reference pitch information.

Further, the Sethares reference does not disclose an apparatus for converting a voice input signal into a voice output signal including **control means for setting control parameters effective to control degrees of the modulation of the frequency value coordinates by the primary reference pitch information and the secondary pitch information, respectively, so that a degree of influence of the pitch of the reference voice signal to a pitch of the output voice signal is determined according to the control parameters.** Because the Sethares reference does not disclose the utilization of secondary pitch information representative of a fractional pitch, the Sethares reference cannot disclose control means to control degrees of modulation according to the secondary pitch information, as is recited in claim 1. Accordingly, claim 1, as amended, distinguishes over the Sethares reference.

The Serra reference does not make up for the deficiencies of the Sethares reference. Specifically, the Serra reference discloses a method of analyzing a sound including a first step of providing analysis data based on the original sound. A second step includes analyzing the analysis data to find a characteristic concerning a predetermined sound element so as to extract data indicative of the characteristic as a sound parameter, wherein the extracted sound parameter denotes a property concerning said element in the original sound. A third step includes the characteristic corresponding to the extracted parameter, from the analysis data, where the waveform of the original sound being represented by a combination of the analysis data from

which said characteristic has been removed and said sound parameter. *(Serra, col. 3, lines 48 - 62).*

There is no disclosure in the Serra reference of an apparatus for converting a voice input signal into a voice output signal including memory means for storing reference pitch information representative of a pitch of the reference voice signal, **the pitch information including primary pitch information representative of a discrete pitch matching a music scale and secondary pitch information representative of a fractional pitch fluctuating relative to the discrete pitch,** first modulating means for modulating the frequency value coordinates of the sinusoidal wave components of the input voice signal according to the primary reference pitch information retrieved from the memory means, to generate modulated frequency value coordinates, **the first modulating means further modulating the modulated frequency value coordinates of the sinusoidal wave components of the input voice signal according to the secondary reference pitch information retrieved from the memory means, to generate further modulated frequency value coordinates.** Further, there is no disclosure of an apparatus for converting a voice input signal into a voice output signal including **control means for setting control parameters effective to control degrees of the modulation of the frequency value coordinates by the primary reference pitch information and the secondary pitch information, respectively, so that a degree of influence of the pitch of the reference voice signal to a pitch of the output voice signal is determined according to the control parameters,** as is recited in claim 1. Accordingly, applicants respectfully submit that claim 1, as amended, distinguishes over the Serra / Sethares reference combination.

Claim 25, as amended, recites limitations similar to claim 1, as amended. Accordingly, applicants respectfully submit that claim 25, as amended, distinguishes over the Sethares / Serra combination for reasons similar to those discussed above in regard to claim 1, as amended.

Claims 2, 4 - 8, 30, 33, 36, 37, 42, and 43 depend, indirectly or directly, on claims 1 and 25. Accordingly, applicants respectfully submit that claims 2, 4 - 8, 30, 33, 36, 37, 42, and 43 distinguish over the Sethares / Serra combination for the same reasons as those discussed above in regard to claim 1, as amended.

Independent 50 distinguishes over the cited references. Independent claim 50 recites:

> An apparatus for converting an input voice signal into an output voice signal according to a reference voice signal, the apparatus comprising:
>
> extracting means for extracting only deterministic components from the input voice signal, the deterministic components including a plurality of sinusoidal wave components which are numbered sequentially, wherein the input voice signal includes the deterministic components and residual components;
>
> separating means for separating the sinusoidal wave components into frequency value coordinates and amplitude value coordinates which are numbered sequentially in a manner the same as the sinusoidal wave components;
>
> memory means for storing reference pitch information representative of a pitch of the reference voice signal, and reference amplitude information representative of reference amplitude value coordinates, which are numbered sequentially, of the sinusoidal wave components contained in the reference voice signal;
>
> first modulating means for modulating the frequency value coordinates of the sinusoidal wave components of the input voice signal according to the reference pitch information retrieved from the memory means, to generate modulated frequency value coordinates;
>
> second modulating means for modulating the amplitude value coordinates of the sinusoidal wave components of the input voice signal according to the reference amplitude information representative of the reference amplitude value coordinates which are numbered correspondingly to the amplitude value coordinates of the input voice signal, retrieved from the memory means such that each amplitude value coordinate of the input voice signal is mixed with a corresponding reference amplitude value coordinate by a ratio which can be set appropriately;
>
> **combining means for combining each of the modulated frequency value coordinates and each of the modulated amplitude value coordinates, which are processed separately from each other and which are numbered correspondingly to each other,** to synthesize sinusoidal wave components of the output voice signal having an output pitch and an output timbre different from an input pitch and an input timbre of the input voice signal, and influenced by a reference pitch and a reference timbre of the reference voice signal; and
>
> mixing means for mixing the synthesized sinusoidal wave components having the

> modulated frequency value coordinates to synthesize the output voice signal having a pitch different from that of the input voice signal and influenced by the pitch of the reference voice signal.

The Sethares reference does not disclose, teach, or suggest the apparatus of claim 50. Although the Examiner previously stated that the Sethares reference did not explicitly teach that the coordinates are numbered sequentially, in this Office Action, the Examiner states that the Sethares reference teaches separating the sinusoidal wave into frequency value coordinates and amplitude value coordinates which are numbered sequentially. *(Office Action, page 2).*

The applicants do not agree with the Examiner. The applicants have added additional limitations to clarify the invention. Specifically, the Sethares reference does not disclose an apparatus for converting an input voice signal into an output voice signal according to a reference voice signal, the apparatus including **combining means for combining each of the modulated frequency value coordinates and each of the modulated amplitude value coordinates, which are processed separately from each other and which are numbered correspondingly to each other,** to synthesize sinusoidal wave components of the output voice signal having an output pitch and an output timbre different from an input pitch and an input timbre of the input voice signal, and influenced by a reference pitch and a reference timbre of the reference voice signal. The Sethares reference discloses that an analog input signal may be passed through a series of bandpass filters having different pass-through frequencies F_1, F_2, ... F_n to analyze the signal in analog form. The amplitude of the signal derived from each bandpass filter is associated with the pass-through frequency of the filter, to produce frequency-amplitude information required to determine dissonance in accordance with

the present invention. *(Sethares, col. 9, lines 57 - 65)*. The frequency and amplitude information is then fed to a computer or processor to carry out a dissonance reduction calculation described above. A signal of appropriate strength for each output partial is sent to an oscillator 22, which produces the output partial. The output of each oscillator is fed to an accumulator 24 where an output signal is produced from the output partials. *(Sethares, col. 9, line 66 - col. 10, line 5)*.

This is not the same as an apparatus for converting an input voice signal into an output voice signal according to a reference voice signal, the apparatus including **combining means for combining each of the modulated frequency value coordinates and each of the modulated amplitude value coordinates, which are processed separately from each other and which are numbered correspondingly to each other,** to synthesize sinusoidal wave components of the output voice signal having an output pitch and an output timbre different from an input pitch and an input timbre of the input voice signal. The Sethares reference never discloses that each of the modulated frequency value coordinates and each of the modulated amplitude value coordinates, **are processed separately from each other**. The Sethares reference is disclosing that the frequency and amplitude information are fed to a computer or microprocessor together to carry out a dissonance reduction calculation. In other words, there is no disclosure in the Sethares reference that the modulated frequency value coordinates and the modulated amplitude value coordinates are processed separately from each other because the opposite happens, the frequency and amplitude information is processed together. Accordingly, applicants respectfully submit that claim 50 distinguishes over the Sethares reference.

The Serra reference does not make up for the deficiencies of the Sethares reference. The Serra reference does not disclose, teach, or suggest a an apparatus for converting an input voice signal into an output voice signal according to a reference voice signal, the apparatus including **combining means for combining each of the modulated frequency value coordinates and each of the modulated amplitude value coordinates, which are processed separately from each other and which are numbered correspondingly to each other,** to synthesize sinusoidal wave components of the output voice signal having an output pitch and an output timbre different from an input pitch and an input timbre of the input voice signal. Accordingly, applicants respectfully submit that claim 50 distinguishes over the Serra / Sethares combination.

Independent claim 51, as amended, further distinguishes over the cited references. Independent claim 51 recites:

> An apparatus for converting an input voice signal into an output voice signal according to a reference voice signal, the apparatus comprising:
>
> extracting means for extracting only deterministic components from the input voice signal, the deterministic components including a plurality of sinusoidal wave components which are numbered sequentially, wherein the input voice signal includes the deterministic components and residual components;
>
> separating means for separating the sinusoidal wave components into frequency value coordinates and amplitude value coordinates ASn' (n =1, 2, 3, ...);
>
> memory means for storing reference pitch information representative of a pitch of the reference voice signal, and reference amplitude information representative of reference amplitude value coordinates ATn (n = 1, 2, 3, ...) of the sinusoidal wave components contained in the reference voice signal;
>
> first modulating means for modulating the frequency value coordinates of the sinusoidal wave components of the input voice signal according to the reference pitch information retrieved from the memory means, to generate modulated frequency value coordinates;
>
> **second modulating means for modulating the amplitude value coordinates ASn' of the sinusoidal wave components of the input voice signal according to the reference amplitude information representative of the reference amplitude value coordinates representative of the amplitude value coordinates ATn retrieved from the memory means by the following calculation (1 - y)*ASn' + y*ATn (n = 1, 2, 3, ...), where the parameter y takes a value from zero to one;**
>
> combining means for combining each of the modulated frequency value coordinates and each of the modulated amplitude value coordinates, which are processed

separately from each other and which are numbered correspondingly to each other, to synthesize sinusoidal wave components of the output voice signal having an output pitch and an output timbre different from an input pitch and an input timbre of the input voice signal, and influenced by a reference pitch and a reference timbre of the reference voice signal; and

mixing means for mixing the synthesized sinusoidal wave components having the modulated frequency value coordinates to synthesize the output voice signal having a pitch different from that of the input voice signal and influenced by the pitch of the reference voice signal.

Neither of the Sethares and Serra references disclose an apparatus including a second modulating means for modulating the amplitude value coordinates ASn' of the sinusoidal wave components of the input voice signal according to the reference amplitude information representative of the reference amplitude value coordinates ATn by the above-highlighted equation, i.e., (1 - y) * ASn' + y * ATn. Accordingly, applicants respectfully submit that claim 51 distinguishes over the Sethares / Serra combination.

Independent claims 9, 17, 26, and 27 recite limitations similar to limitations of independent claim 51. Accordingly, applicants respectfully submit that independent claims 9, 17, 26, and 27 distinguish over the Sethares and Serra references, alone or in combination, for similar reasons as discussed above in regard to independent claim 51.

Dependent claims 10 - 11, 14 - 16, 18, 20 - 24, 28, 29, 31, 32, 34 - 35, 28 - 41, and 44 - 47 depend, directly or indirectly from independent claims 1, 9, 17, 26, and 27. Accordingly, applicants respectfully submit that dependent claims 10 - 11, 14 - 16, 18, 20 - 24, 28, 29, 31, 32, 34 - 35, 28 - 41, and 44 - 47 all distinguish over the Sethares and Serra references, alone or in combination, for the same reasons as discussed above in regard to independent claims 9, 17, 26, and 27.

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Applicants believe that the foregoing amendments place the application in condition for allowance, and a favorable action is respectfully requested. If for any reason the Examiner finds the application other than in condition for allowance, the Examiner is requested to call either of the undersigned attorneys at the Los Angeles telephone number (213) 488-7100 to discuss the steps necessary for placing the application in condition for allowance should the Examiner believe that such a telephone conference would advance prosecution of the application.

Respectfully submitted,

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